

Claims

1. An actuator comprising a series of elements each rotatable relative to the next, a housing accommodating at least part of the series of elements with one end of the series projecting freely beyond an exit of the housing, the elements being guided to follow a non-linear path to the exit, means for driving the series of elements relative to the housing to vary the total length of elements projecting beyond the exit, and means for maintaining the projecting elements in linear alignment in a substantially rigid, column.

2. An actuator as claimed in claim 1, wherein the maintaining means comprises a flexible, substantially inelastic toothed belt which is brought progressively into positive engagement with the elements as they rotate into alignment with the column.

3. An actuator as claimed in claim 2, wherein the elements are pivotally coupled each to the next along one edge of the series of elements and the belt is brought into engagement with the elements along the opposite edge.

4. An actuator as claimed in claim 1, 2 or 3, wherein the elements are hollow and the drive means includes at least one gear located inside the elements as they pass through the housing and which drivingly engages an inside surface of the elements, the elements having an opening on one side which allows passage of a support means for the gear wheel.

5. An actuator as claimed in claim 4, wherein each element has a helically-threaded bore whose axis, when the element is in the linearly aligned column, is coaxial with other such bores in the column to form a continuous  
5 helical thread along the column, and wherein the gear wheel comprises a worm gear disposed at the free end of a drive shaft whose rotational axis is coaxial with that of the bores in the column, the worm gear meshing with at least one element in the column at any one time such that  
10 rotation of the worm gear increases or decreases the length of the column according to the direction of rotation of the worm gear, each element having a side opening for passage of the drive shaft to allow each element to join or leave the column by rotation relative  
15 to the next element.

6. An actuator as claimed in any preceding claim, wherein the series of elements enters the housing through an input guide which is rotatable relative to the housing  
20 over a range of angles relative to the linearly aligned column.

7. An actuator as claimed in claim 6 when directly or indirectly dependent on claim 2, wherein the elements are  
25 engaged by the belt in the input guide whereby the elements are maintained in linear alignment prior to entering the guide.

8. An actuator as claimed in any preceding claim,  
30 wherein the actuator further comprises a sprocket wheel which engages with and guides the elements.

9. A device for moving a load comprising a base portion and a load bearing portion and means for moving the load

bearing portion, the means for moving the load bearing portion comprising an actuator according to any preceding claim.